

A

NEW, CONTINUATION, DIVISIONAL OR  
CONTINUATION-IN-PART APPLICATION  
UNDER 37 C.F.R. §1.53(b)

Attorney Docket No. 9432-000082

Express Mail Label No. EJ 179 205 099 US

Date August 26, 1999

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Hon. Commissioner of Patents and Trademarks  
Washington, D. C. 20231

Sir:

Transmitted herewith for filing under 37 C.F.R §1.53(b) is a patent application for

**Mechanism for Storing Information About Recorded Television Broadcasts**

identified by: ☐ First named inventor \_\_\_\_\_  
or ☒ Attorney Docket No. (see above)

1. **Type of Application**

☒ This application is a new (non-continuing) application.

☐ This application is a ☐ continuation / ☐ divisional / ☐ continuation-in-part of prior application No. \_\_\_\_\_. Amend the specification by inserting before the first line the sentence:

--This is a [continuation/division/continuation-in-part] of United States patent application No. \_\_\_\_\_, filed \_\_\_\_\_.--

☐ The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

If for some reason applicant has not requested a sufficient extension of time in the parent application, and/or has not paid a sufficient fee for any necessary response in the parent application and/or for the extension of time necessary to prevent the abandonment of the parent application prior to the filing of this application, please consider this as a Request for an Extension for the required time period and/or authorization to charge our Deposit Account No. 08-0750 for any fee that may be due. THIS FORM IS BEING FILED IN TRIPLICATE: one copy for this application; one copy for use in connection with the Deposit Account (if applicable); and one copy for the above-mentioned parent application (if any extension of time is necessary).

2. **Contents of Application**

a. Specification of 22 pages;

- ☐ A microfiche computer program (Appendix);  
☐ A nucleotide and/or amino acid sequence submission;

☐ Because the enclosed application is in a non-English language, a verified English translation ☐ is enclosed ☐ will be filed.

☐ Cancel original claims \_\_\_\_\_ of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing date purposes.)

b. ☒ Drawings on 3 sheets;

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- c. ☒ An unsigned Declaration ☒ is enclosed / a signed Declaration will be filed in accordance with 37 C.F.R. §1.53(f).

The enclosed Oath/Declaration is ☐ newly executed / ☐ a copy from a prior application under 37 C.F.R. §1.63(d) / ☐ accompanied by a statement requesting the deletion of person(s) not inventors in the continuing application.

d. **Fees**

<b>FILING FEE</b>	Number	Number	Basic Fee
<b>CALCULATION</b>	Filed	Extra	Rate
Total Claims	12 - 20 =	0 ×	\$18.00 =
Independent Claims	1 - 3 =	0 ×	\$78.00 =
Multiple Dependent Claim(s) Used .....			\$260.00 =
<b>FILING FEE - NON-SMALL ENTITY</b> .....			<b>760.00</b>
<b>FILING FEE - SMALL ENTITY: Reduction by 1/2</b> .....			
<input type="checkbox"/> Verified Statement under 37 C.F.R. §1.27 is enclosed.			
<input type="checkbox"/> Verified Statement filed in prior application.			
Assignment Recordal Fee (\$40.00) .....			
37 C.F.R. §1.17(k) Fee (non-English application) .....			
<b>TOTAL</b> .....			<b>760.00</b>

- ☒ A check is enclosed to cover the calculated fees. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to Deposit Account No. 08-0750. A duplicate copy of this document is enclosed.

- ☐ The calculated fees will be paid within the time allotted for completion of the filing requirements.

- ☐ The calculated fees are to be charged to Deposit Account No. 08-0750. The Commissioner is hereby authorized to charge any additional fees that may be required, or credit any overpayment, to said Deposit Account. A duplicate copy of this document is enclosed.

3. **Priority Information**

- ☐ **Foreign Priority:** Priority based on \_\_\_\_\_ Application No. \_\_\_\_\_, filed \_\_\_\_\_, is claimed.

- ☐ A copy of the above referenced priority document ☐ is enclosed / ☐ will be filed in due course, pursuant to 35 U.S.C. §119(a)-(d).

- ☐ **Provisional Application Priority:** Priority based on United States Provisional Application No. \_\_\_\_\_, filed \_\_\_\_\_, is claimed under 35 U.S.C. §119(e).

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#### 4. Other Submissions

☐ A Preliminary Amendment is enclosed.

☐ An Information Disclosure Statement, \_\_\_\_\_ sheets of PTO Form 1449, and \_\_\_\_\_ patent(s)/publications/documents are enclosed.

☒ An unsigned power of attorney

☒ is submitted ☒ with the new Declaration and a signed power of attorney will be submitted with the signed Declaration.

☐ is of record in the prior application and ☐ is in the original papers / ☐ a copy is enclosed.

☐ An Assignment of the invention

☐ is enclosed with a cover sheet pursuant to 37 C.F.R. §§3.11, 3.28 and 3.31.

☐ is of record in a prior application. The assignment is to \_\_\_\_\_, and is recorded at Reel \_\_\_\_\_, Frame(s) \_\_\_\_\_.

☐ An Establishment of Assignee's Right To Prosecute Application Under 37 C.F.R. §3.73(b), and Power Of Attorney is enclosed.

☒ An Express Mailing Certificate is enclosed.

☒ Other: return postcard

Attention is directed to the fact that the correspondence address for this application is:

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Respectfully,



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and Trademarks  
Washington, D.C. 20231

Sir:

**EXPRESS MAILING CERTIFICATE**

Applicant: Jean-Claude Junqua, et al

Serial No (if any):

For: **Mechanism for Storing Information About Recorded Television Broadcasts**

Docket: 9432-000082

Attorney: Gregory A. Stobbs

"Express Mail" Mailing Label Number ..... **EJ 179 205 099 US**

Date of Deposit ..... **August 26, 1999**

I hereby certify and verify that the accompanying **return postcard; \$760.00 check for filing fee; 3-page transmittal letter (in triplicate); 22-page application; 3 sheets of drawings (showing Figures 1-3); 3-page unsigned Declaration and Power of Attorney; along with copies of this Express Mailing Certificate** are being deposited with the United States Postal Service "Express Mail Post Office To Addressee" service under 37 C.F.R. 1.10 on the date indicated above and are addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

  
\_\_\_\_\_  
Signature of Person Mailing Documents

**MECHANISM FOR STORING INFORMATION  
ABOUT RECORDED TELEVISION BROADCASTS**

**Background and Summary of the Invention**

5           The present invention relates generally to interactive television  
and interactive "replay" TV. More particularly, the invention relates to a  
speech-enabled system for automatically creating a catalog describing  
the contents of each TV owner's "library" of stored television broadcasts.  
The user interacts with the system by speaking complex, natural-  
10   language requests for information. The speech recognizer and natural-  
language parser of the system interpret the meaning of the user's  
requests and locate those recorded items in the owner's library that best  
respond to the request. In this way, a user can readily access any  
previously recorded information without the need for time consuming  
15   searching.

          The system may also maintains a database of user-specific  
information, such as information about which recorded programs the  
user has accessed more recently (or never). This information may be  
used, for example, to suggest to the user which recorded programs may  
20   be deleted when the capacity of the recording device is near full.

          For a more complete understanding of the invention, its objects  
and advantages, refer to the following specification and to the  
accompanying drawings.

### **Brief Description of the Drawings**

Figure 1 is a system block diagram of the system for storing information about recorded broadcasts, illustrating the presently preferred file system structure;

Figure 2 is a block diagram depicting the components of the natural language parser of the presently preferred embodiment of the invention; and

Figure 3 is a block diagram depicting the components of the local parser of the presently preferred embodiment of the invention.

### **Description of the Preferred Embodiment**

The basic interactive, replay TV allows the user to specify which programs should be stored for future viewing. Current technology uses hard disk recorders to store the program content. In the future, hard disk recorders may be replaced by other media, including optical media and non-volatile random access memory.

Regardless of the type of storage media used, the basic problem is how to locate stored information at a later time.

The presently preferred embodiment provides an interactive, multimodal user interface for storing and retrieving information. The replay file system of the preferred embodiment captures information about each recorded program from the electronic program guide

available via cable, satellite or internet.

Referring to Figure 1, a storage medium, such as a hard disk recorder medium, is illustrated at **10**. The medium may be suitably partitioned to store program content (i.e., recorded broadcasts) together with a file system content access table used to retrieve information at a later date. The stored program content, depicted diagrammatically at **12**, may be stored on the medium **10** according to any suitable physical file storage structure. For example, the content may be stored in blocks of a predetermined size at specified starting locations within the storage medium.

The replay file system **14** used to access the stored program content may also be stored on medium **10**, or alternatively on some other storage device or memory. The file system structure is illustrated generally at **16**. The structure includes a storage location record **18** for each program recorded. The information stored in each storage location record may constitute a pointer or address into the medium **10**, showing where a particular stored program content resides.

Associated with each storage location record is a collection of additional data that is extracted from the electronic program guide, as will be more fully discussed below. This additional information may include, for example, a program identifier record **20**, which may be the name of the program or other suitable label. In addition, other electronic

program guide data may be stored in association with each program I.D.

This other electronic program guide data is illustrated generally at **22** and may include such additional information as the program category (movie, news, weather, etc.) which network broadcasts the program

5 content, the date and time of the broadcast, the actors starring in the broadcast, the director, and so forth. While this other electronic program guide data is not required to locate a recorded program if the program I.D. is known, the additional data is quite useful for enhancing interactive dialog between the user and the system when the program title or label  
10 is not known.

In addition, the replay file system may include associated user data records, illustrated at **24**. These additional user data records may include, for example, the dates and times a particular program content was viewed, any recorded indexes the user has added to identify  
15 favorite parts of the program content, and so forth. The dates and times a program has been previously viewed can be used with a special feature of the system that mediates how contents of the medium may be selectively erased if the storage medium is nearing full. The user can record preferences in the user data record **24**, indicating whether a  
20 particular recorded selection may be automatically erased after a predetermined time, or selectively erased only after it has been viewed, or never erased unless explicitly requested by the user.



An important aspect of the presently preferred replay file system is that the information used to locate recorded program content does not need to be explicitly written into the file system by the user. Rather, the system automatically extracts the appropriate identifying information from the electronic program guide resource that is available from the cable television or satellite broadcast infrastructure or over the Internet. The system automatically extracts electronic program guide information when the user records program content. The system does this through one of several mechanisms, depending on the particular embodiment.

In one embodiment, the tuner **30** tunes to a particular channel so that program content **32** may be viewed by the user or stored in storage medium **10**. The tuner may be connected to a suitable cable television infrastructure or satellite infrastructure, for example. While the tuner is accessing the program content, it also obtains the electronic program guide data **34** from the same cable or satellite infrastructure. Tuner **30** passes the electronic program guide information to the replay file system **14**, where the appropriate information is extracted and included in the file system record for the recorded program.

In an alternate embodiment, the electronic program guide information may be accessed from the Internet by a separate Internet access module **36**. The Internet access module **36** can be coupled by cable modem to the internet or by telephone to an internet service

provider. The internet access module obtains relevant electronic program guide information pertaining to the program being viewed and stores this information into the replay file system.

Once the stored program content and its associated file system  
5 information has been recorded, the user has a number of different options for retrieving this recorded information. The system employs a sophisticated speech-enabled, multimodal user interface whereby the user can use a combination of speech and/or on-screen prompted input (through remote control pushbuttons or the like) to request recorded  
10 information for replay.

The speech recognizer **50** receives spoken input through a suitable microphone which may be incorporated into the remote control, into a hands free device placed on a nearby coffee table or the like, or into the storage device or television set. Output from the speech  
15 recognizer is supplied to a natural language parser **52**.

The natural language parser of the preferred embodiment is a goal-oriented parser that uses pre-defined goal-oriented grammars to identify different user requests. The goal-oriented grammars are structured to correspond with the electronic program guide information  
20 by which the stored program content has been indexed.

The system includes a dialog system **54** that responds to both output from the natural language parser **52** and also to on-screen

prompted input. The dialog system has the ability to interact with the user, asking the user additional questions if necessary, in order to ascertain what stored program or programs the user is interested in retrieving. The dialog system is provided with a file system access  
5 module **56**. This module accesses the replay file system records, to return all file system records that match the user's request.

For example, the user could speak into the system, "I would like to watch a movie." The dialog system would use its file system access module to ascertain whether there are any movies recorded on the  
10 storage medium. If there are numerous movies stored on the system, for instance, the dialog system may prompt the user to narrow the request. The prompt can be supplied as an on-screen prompt or a synthesized speech prompt, or both. In this case, the prompt might ask the user what category of movie he or she is interested in viewing, listing the  
15 categories for which there are currently stored programs. The user could then select the category, and the system would continue to prompt the user until the user selected one program for viewing.

The dialog system **54** may also guide the user through other system operations, including the recording operation and other  
20 maintenance functions. The dialog system may be invoked, for example, when the disk is near full, and the system can determine by checking the electronic program guide data that the requested program will not fit on

the remaining portion of the disk. The dialog system could prompt the user to either refrain from recording the program or to erase one or more previously recorded programs to make room.

Figure 2 depicts components of the natural language parser 52 in more detail. In particular, speech understanding module 128 includes a local parser 160 to identify predetermined relevant task-related fragments. Speech understanding module 128 also includes a global parser 162 to extract the overall semantics of the speaker's request.

The local parser 160 utilizes in the preferred embodiment small and multiple grammars along with several passes and a unique scoring mechanism to provide parse hypotheses. For example, the novel local parser 102 recognizes according to this approach phrases such as dates, names of people, and movie categories. If a speaker utters "record me a comedy in which Mel Brooks stars and is shown before January 23rd", the local parser recognizes: "comedy" as being a movie category; "January 23rd" as a date; and "Mel Brooks" as an actor. The global parser assembles those items (movie category, date, etc.) together and recognizes that the speaker wishes to record a movie with certain constraints.

Speech understanding module 128 includes knowledge database 163 which encodes the semantics of a domain (i.e., goal to

be achieved). In this sense, knowledge database **163** is preferably a domain-specific database as depicted by reference numeral **165** and is used by dialog manager **130** to determine whether a particular action related to achieving a predetermined goal is possible.

5           The preferred embodiment encodes the semantics via a frame data structure **164**. The frame data structure **164** contains empty slots **166** which are filled when the semantic interpretation of global parser **162** matches the frame. For example, a frame data structure (whose domain is tuner commands) includes an empty slot for specifying the  
10 viewer-requested channel for a time period. If viewer **120** has provided the channel, then that empty slot is filled with that information. However, if that particular frame needs to be filled after the viewer has initially provided its request, then dialog manager **130** instructs computer response module **134** to ask viewer **120** to provide a desired  
15 channel.

          The frame data structure **164** preferably includes multiple frames which each in turn have multiple slots. One frame may have slots directed to attributes of a movie, director, and type of movie. Another frame may have slots directed to attributes associated with the  
20 time in which the movie is playing, the channel, and so forth.

          The following reference discusses global parsers and frames: R. Kuhn and R. D. Mori, *Spoken Dialogues with Computers (Chapter 14:*

*Sentence Interpretation*), Academic Press, Boston (1998).

Dialog manager **130** uses dialog history data file **167** to assist in filling in empty slots before asking the speaker for the information. Dialog history data file **167** contains a log of the conversation which  
5 has occurred through the device of the present invention. For example, if a speaker utters "I'd like to watch another Marilyn Monroe movie," the dialog manager **130** examines the dialog history data file **167** to check what movies the user has already viewed or rejected in a previous dialog exchange. If the speaker had previously rejected  
10 "Some Like It Hot", then the dialog manager **130** fills the empty slot of the movie title with movies of a different title. If a sufficient number of slots have been filled, then the present invention will ask the speaker to verify and confirm the program selection. Thus, if any assumptions made by the dialog manager **130** through the use of dialog history data  
15 file **167** prove to be incorrect, then the speaker can correct the assumption.

The natural language parser **52** analyzes and extracts semantically important and meaningful topics from a loosely structured, natural language text which may have been generated as the output of  
20 an automatic speech recognition system (ASR) used by a dialogue or speech understanding system. The natural language parser **52** translates the natural language text input to a new representation by

generating well-structured tags containing topic information and data, and associating each tag with the segments of the input text containing the tagged information. In addition, tags may be generated in other forms such as a separate list, or as a semantic frame.

5 Robustness is a feature of the natural language parser **52** as the input can contain grammatically incorrect English sentences, due to the following reasons: the input to the recognizer is casual, dialog style, natural speech can contain broken sentences, partial phrases, and the insertion, omission, or mis-recognition of errors by the speech recognizer  
10 even when the speech input is considered correct. The natural language parser **52** deals robustly with all types of input and extracts as much information as possible.

Figure 3 depicts the different components of the local parser **160** of the natural language parser **24**. The natural language parser  
15 **52** preferably utilizes generalized parsing techniques in a multi-pass approach as a fixed-point computation. Each topic is described as a context-sensitive LR (left-right and rightmost derivation) grammar, allowing ambiguities. The following are references related to context-sensitive LR grammars: A. Aho and J. D. Ullman, *Principles of*  
20 *Compiler Design*, Addison Wesley Publishing Co., Reading, Massachusetts (1977); and N. Tomita, *Generalized LR Parsing*, Kluwer Academic Publishers, Boston, Massachusetts (1991).

At each pass of the computation, a generalized parsing algorithm is used to generate preferably all possible (both complete and partial) parse trees independently for each targeted topic. Each pass potentially generates several alternative parse-trees, each parse-  
5 tree representing a possibly different interpretation of a particular topic.

The multiple passes through preferably parallel and independent paths result in a substantial elimination of ambiguities and overlap among different topics. The generalized parsing algorithm is a systematic way of scoring all possible parse-trees so that the (N) best  
10 candidates are selected utilizing the contextual information present in the system.

Local parsing system **160** is carried out in three stages: lexical analysis **220**; parallel parse-forest generation for each topic (for example, generators **230** and **232**); and analysis and synthesis of  
15 parsed components as shown generally by reference numeral **234**.

#### Lexical analysis:

A speaker utters a phrase that is recognized by an automatic speech recognizer **217** which generates input sentence **218**.  
20 Lexical analysis stage **220** identifies and generates tags for the topics (which do not require extensive grammars) in input sentence **218** using lexical filters **226** and **228**. These include, for example, movie names;



category of movie; producers; names of actors and actresses; and the like. A regular-expression scan of the input sentence **218** using the keywords involved in the mentioned exemplary tags is typically sufficient at this level. Also, performed at this stage is the tagging of words in the input sentence that are not part of the lexicon of particular grammar. These words are indicated using an X-tag so that such noise words are replaced with the letter "X".

#### Parallel parse-forest generation:

The natural language parser **52** uses a high-level general parsing strategy to describe and parse each topic separately, and generates tags and maps them to the input stream. Due to the nature of unstructured input text **218**, each individual topic parser preferably accepts as large a language as possible, ignoring all but important words, dealing with insertion and deletion errors. The parsing of each topic involves designing context-sensitive grammar rules using a meta-level specification language, much like the ones used in LR parsing. Examples of grammars include grammar A **240** and grammar B **242**. Using the present invention's approach, topic grammars **240** and **242** are described as if they were an LR-type grammar, containing redundancies and without eliminating shift and reduce conflicts. The result of parsing an input sentence is all possible parses based on the

grammar specifications.

Generators **230** and **232** generate parse forests **250** and **252** for their topics. Tag-generation is done by synthesizing actual information found in the parse tree obtained during parsing. Tag generation is accomplished via tag and score generators **260** and **262** which respectively generate tags **264** and **266**. Each identified tag also carries information about what set of input words in the input sentence are covered by the tag. Subsequently the tag replaces its cover-set. In the preferred embodiment, context information **267** is utilized for tag and score generations, such as by generators **260** and **262**. Context information **267** is utilized in the scoring heuristics for adjusting weights associated with a heuristic scoring factor technique that is discussed below. Context information **267** preferably includes word confidence vector **268** and dialogue context weights **269**. However, it should be understood that the parser **52** is not limited to using both word confidence vector **268** and dialogue context weights **269**, but also includes using one to the exclusion of the other, as well as not utilizing context information **267**.

Automatic speech recognition process block **217** generates word confidence vector **268** which indicates how well the words in input sentence **218** were recognized. Dialog manager **130** generates dialogue context weights **269** by determining the state of the dialogue.

For example, dialog manager **130** asks a user about a particular topic, such as, what viewing time is preferable. Due to this request, dialog manager **130** determines that the state of the dialogue is time-oriented. Dialog manager **130** provides dialogue context weights **269** in order to  
5 inform the proper processes to more heavily weight the detected time-oriented words.

#### Synthesis of Tag-components:

The topic spotting parser of the previous stage generates a  
10 significant amount of information that needs to be analyzed and combined together to form the final output of the local parser. The parser **52** is preferably as “aggressive” as possible in spotting each topic resulting in the generation of multiple tag candidates. Additionally in the presence of numbers or certain key-words, such as “between”,  
15 “before”, “and”, “or”, “around”, etc., and especially if these words have been introduced or dropped due to recognition errors it is possible to construct many alternative tag candidates. For example, an input sentence could have insertion or deletion errors. The combining phase determines which tags form a more meaningful interpretation of the  
20 input. The parser **52** defines heuristics and makes a selection based on them using a N-Best candidate selection process. Each generated tag corresponds to a set of words in the input word string, called the

tag's cover-set.

A heuristic is used that takes into account the cover-sets of the tags used to generate a score. The score roughly depends on the size of the cover-set, the sizes in the number of the words of the gaps within the covered items, and the weights assigned to the presence of certain keywords. In the preferred embodiment, ASR-derived confidence vector and dialog context information are utilized to assign priorities to the tags. For example applying channel-tags parsing first potentially removes channel-related numbers that are easier to identify uniquely from the input stream, and leaves fewer numbers to create ambiguities with other tags. Preferably, dialog context information is used to adjust the priorities.

### **N-Best Candidates Selection**

At the end of each pass, an N-best processor **270** selects the N-best candidates based upon the scores associated with the tags and generates the topic-tags, each representing the information found in the corresponding parse-tree. Once topics have been discovered this way, the corresponding words in the input can be substituted with the tag information. This substitution transformation eliminates the corresponding words from the current input text. The output **280** of each pass is fed-back to the next pass as the new input, since the

substitutions may help in the elimination of certain ambiguities among competing grammars or help generate better parse-trees by filtering out overlapping symbols.

Computation ceases when no additional tags are generated in the last pass. The output of the final pass becomes the output of the local parser to global parser **162**. Since each phase can only reduce the number of words in its input and the length of the input text is finite, the number of passes in the fixed-point computation is linearly bounded by the size of its input.

The following scoring factors are used to rank the alternative parse trees based on the following attributes of a parse-tree:

- Number of terminal symbols.
- Number of non-terminal symbols.
- The depth of the parse-tree.
- The size of the gaps in the terminal symbols.
- ASR-Confidence measures associated with each terminal symbol.
- Context-adjustable weights associated with each terminal and non-terminal symbol.

Each path preferably corresponds to a separate topic that can be developed independently, operating on a small amount of data, in a computationally inexpensive way. The architecture of the parser **52** is

flexible and modular so incorporating additional paths and grammars, for new topics, or changing heuristics for particular topics is straight forward, this also allows developing reusable components that can be shared among different systems easily.

5           From the foregoing it will be seen that the system of the invention provides an interactive replay system with dynamically-built replay file system structure. Because the file system structure automatically extracts relevant information from the electronic program guide resources available via cable, satellite and/or internet, the system  
10 requires very little effort on the part of the user, while allowing a very rich interactive dialog to locate and replay stored information.

          While the invention has been described in its presently preferred form, it will be understood that the invention is capable of modification without departing from the spirit of the invention as set forth in the  
15 appended claims.

## **Claims**

1. A file system for organizing recorded items of program content, comprising:

- a memory having a data structure for storing the location of a  
5 recorded item of program content in association with at least one  
electronic program guide attribute selected from the group consisting  
of: program title identifier, program category, broadcasting network,  
date of broadcast, time of broadcast, actors, and director;  
an interface for receiving electronic program guide attribute  
10 information about a specific item of program content to be stored;  
a file write mechanism that automatically stores said electronic  
program guide attribute information about said item of program content  
to be stored in said data structure, and  
a file read mechanism that ascertains the storage location of a  
15 recorded item of program content based on said at least one electronic  
program guide attribute accessed from said data structure.

- 2. The file system of claim 1 further comprising a natural  
language dialog system that interacts with said file read mechanism for  
20 supplying electronic program guide attribute inquiries to said read  
mechanism based on spoken requests of a user.

3. The file system of claim 1 wherein said data structure further includes at least one user data attribute in association with said location of a recorded item of program content.

5 4. The file system of claim 3 wherein said user data attribute stores a record of when the item of program content was viewed by a user.

10 5. The file system of claim 3 wherein said user data attribute stores at least one user-defined index that identifies a user-defined location within a recorded item.

15 6. The file system of claim 3 further comprising storage system maintenance system that selectively erases previously recorded items of program content based at least in part upon said user data attribute.

20 7. The file system of claim 1 wherein said interface for receiving electronic program guide information comprises an internet access system capable of accessing at least one internet-based provider of electronic program guide information.



8. The file system of claim 1 wherein said interface for receiving electronic program guide information comprises a tuner for retrieving electronic program guide information from a supplier of program content.

5

9. A system for recording program content comprising a storage medium for storing at least one item of program content and a file system as defined in claim 1.

10

10. The system of claim 9 wherein said storage medium is a disk memory.

11. The system of claim 9 wherein said storage medium is a tape memory.

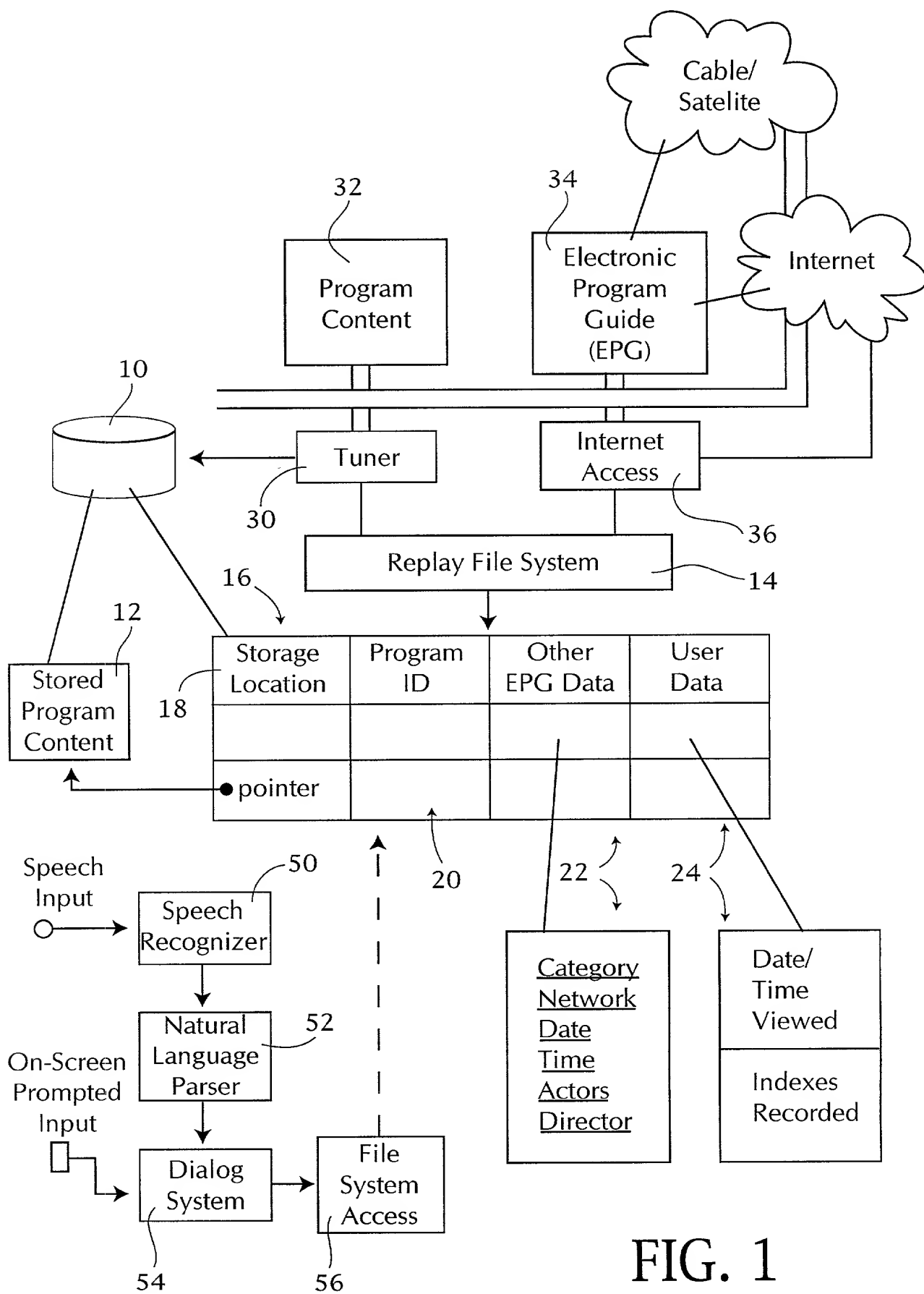
15

12. The system of claim 9 wherein said storage medium is an electronic memory.

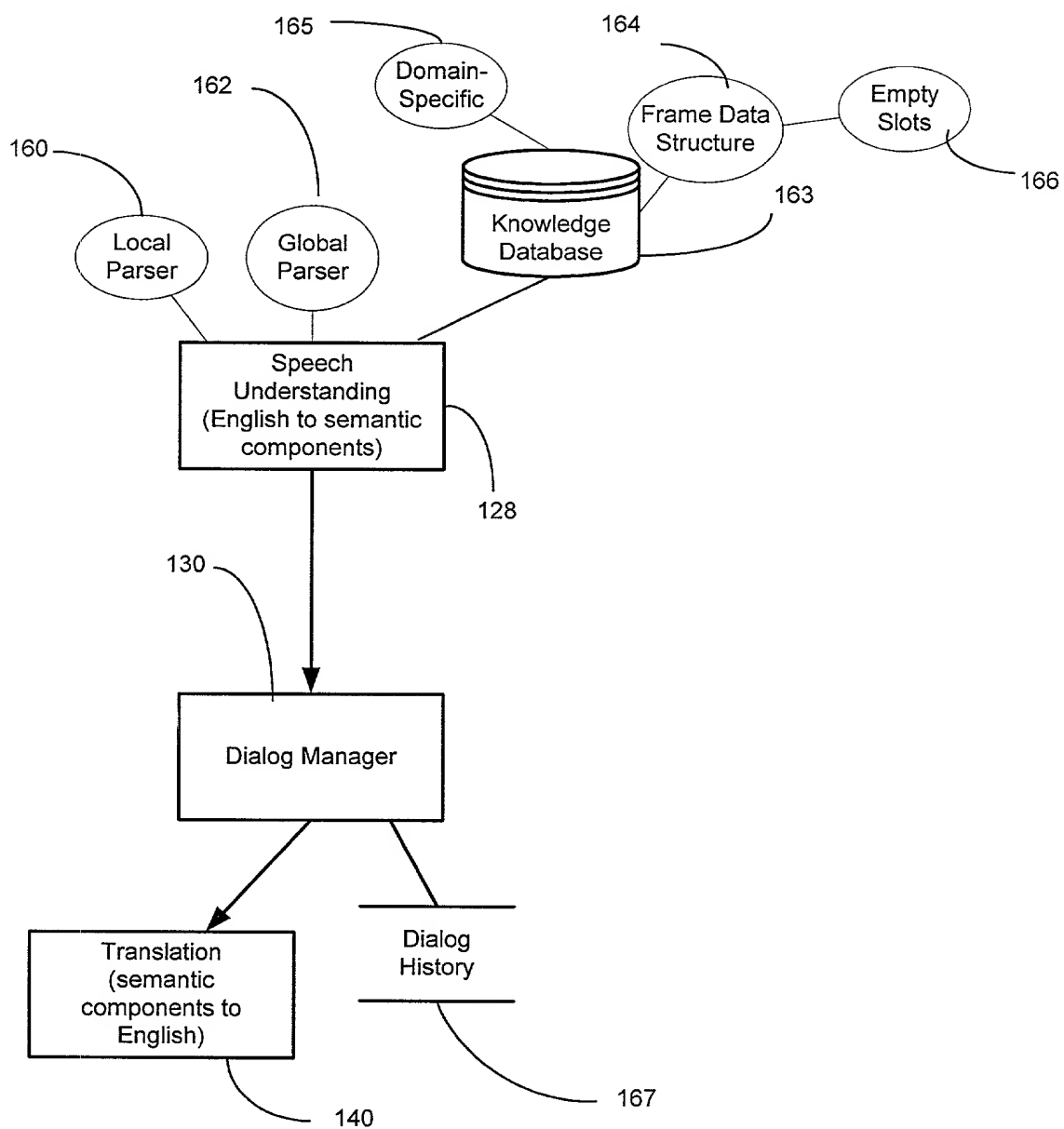
## **Abstract**

Program content, recorded to a storage medium such as disk recorder, optical recorder or random access memory, is indexed by the replay file system. The file system maintains a storage location and program I.D. record for each recorded program. The file system further maintains other data obtained from an electronic program guide that may be accessed by downloading from the cable or satellite infrastructure or over the internet. The file system also may store additional user data, such as the date and time the program was last viewed, together with any user-recorded indexes. The file system may be accessed through natural language input speech. The system includes a speech recognizer and natural language parser, coupled to a dialog system that engages the user in a dialog to determine what the user is interested in accessing from the storage medium. The natural language parser operates with a task-based grammar that is keyed to the electronic program guide data and user data maintained by the file system.

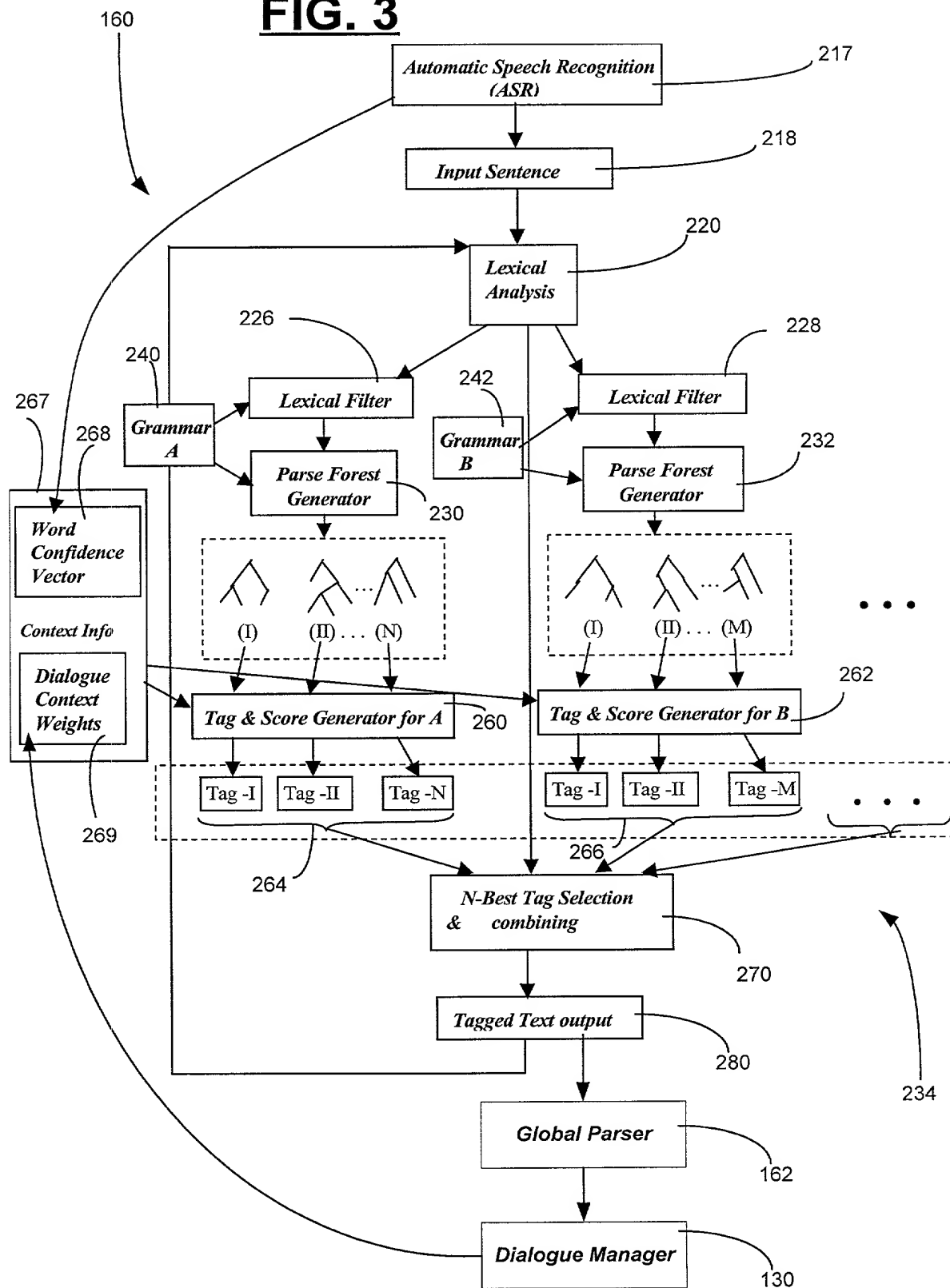
Case No. 9432-000082



**FIG. 2**



**FIG. 3**



**DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**Mechanism for Storing Information  
About Recorded Television Broadcasts**

the specification of which (check one)

- ☒ is attached hereto.
- ☐ was filed on \_\_\_\_\_ as Application  
Serial No. \_\_\_\_\_ and was amended on  
\_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application or to the patentability of the invention claimed therein in accordance with Title 37, Code of Federal Regulations, section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, section 119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

**PRIOR FOREIGN APPLICATION(S)**

			<u>Priority Claim</u>	
(Number)	(Country)	(Day/Month/Year filed)	Yes	No
_____	_____	_____	_____	_____
(Number)	(Country)	(Day/Month/Year filed)	Yes	No
_____	_____	_____	_____	_____
(Number)	(Country)	(Day/Month/Year filed)	Yes	No
_____	_____	_____	_____	_____

## DECLARATION AND POWER OF ATTORNEY

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States Provisional application(s) listed below:

### PRIOR PROVISIONAL APPLICATIONS

\_\_\_\_\_  
(application serial number) (Month / Day / Year filed)

\_\_\_\_\_  
(application serial number) (Month / Day / Year filed)

I hereby claim the benefit under Title 35, United States Code, section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Application Serial No.	Filing Date	Status - patented, pending, abandoned
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint Gregory A. Stobbs, Reg. No. 28,764, and each principal, attorney of counsel, associate and employee of Harness, Dickey & Pierce, P.L.C., who is a registered Patent Attorney, my attorney with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. I request the Patent and Trademark Office to direct all correspondence and telephone calls relative to this application to Harness, Dickey & Pierce, P.L.C., P. O. Box 828, Bloomfield Hills, Michigan 48303 (248) 641-1600.

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Date: \_\_\_\_\_

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**DECLARATION AND POWER OF ATTORNEY**

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**Full name of third joint inventor, if any:** Tony Davis

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Date: \_\_\_\_\_

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Fifth Inventor's signature: \_\_\_\_\_

Date: \_\_\_\_\_

Residence: \_\_\_\_\_

Citizenship: \_\_\_\_\_

Post Office Address: \_\_\_\_\_